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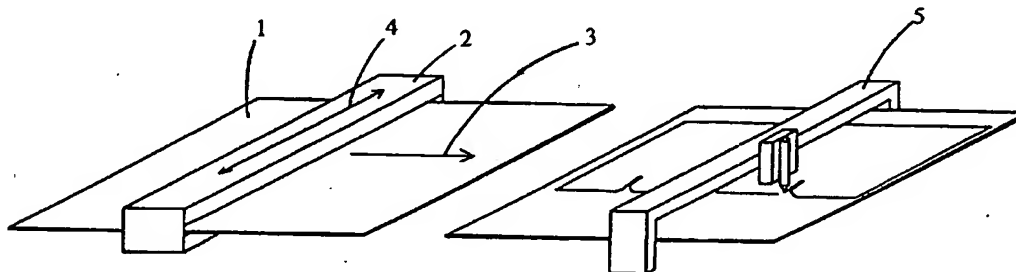
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ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: METHOD TO PRODUCE GRAPHICALLY AND TWO-DIMENSIONALLY DESIGNED PIECES



(57) Abstract: The present invention relates to a method of using an ink-jet printer (2) to apply a graphic design pattern to substantially plane workpiece (1) and then using a laser cutter (5) to make through-cuts in the workpiece (1) so that items with a two dimensional design are created, which are assembled into a three-dimensional, self-locking and self-supporting construction, without the need for conventional assembly elements, according to a predefined three-dimensional pattern.

WO 2004/041541 A1

METHOD TO PRODUCE GRAPHICALLY AND TWO-DimensionALLY DESIGNED PIECES

The present invention relates to a method according to the pre-characterising part of claim 1.

5

Background of the invention

Most shops have a need to alter or renew their interior fittings at regular intervals, one example being clothing shops before a new clothing season. Such alteration or renewal must preferably not take long to carry out. In many shops there is also a desire to incorporate advertising into the fittings. The type of shop fittings required can vary from one shop to another, just as the choice of furnishings varies according to people's tastes when furnishing our homes. For example, there may be a need to modify the size and dimensions of furniture according to the space to be fitted out.

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Nowadays most shops have fittings, that is to say counters, shelving and the like of timber material, for example, which are conventionally assembled using bolts and nuts, for example. This also applies to furniture in the home. The material is heavy and assembly of the fittings/furniture takes a relatively long time, whilst the fittings and/or items of furniture are not completely recyclable. Furthermore, there is not much scope for flexibility in the design construction of the fittings or furniture. Any advertising in shops often comes in the form of separate advertising posters or signs.

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Object of the invention

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The object of the present invention is to provide a method of creating two-dimensional graphic design items sequentially on one and the same line.

This object is achieved by a method of the generic type in that the invention has the characterising features according to claim 1.

30

The method according to the invention furthermore enables the two-dimensional graphic design items to be assembled into a three-dimensional construction that is self-locking so that no bolts or nuts are required.

- 5 The method according to the invention moreover affords the advantages that the material and hence also the assembled three-dimensional construction is lightweight and can be made fully recyclable. The material can moreover be made water-repellent. Since the graphics are incorporated into the design construction, this also affords the advantage that no separate advertising is necessary.

10

Brief description of the drawing

The invention will be explained below with reference to the drawing, in which:

- 15 Fig. 1 shows a sequential two-dimensional graphic design process on a workpiece,

Figs. 2 to 8 show an example of an assembly of two-dimensional graphic design items into a self-supporting and self-locking three-dimensional construction, and

- 20 Fig. 9 shows an example of the graphics incorporated into the design construction.

Description of the invention

- Fig. 1 shows how a substantially plane workpiece 1 moves in a conventional ink-jet printer 2, shown from left to right in the figure as illustrated by the arrow 3, whilst the ink-jet printer applies a graphic pattern to the surface of the workpiece 1 as the ink jets move transversely over the workpiece 1, as shown by the arrow 4. The ink-jet printer 2 is digitally controlled, which means that the appearance of the graphic pattern can be readily modified by means of a computer. Once the graphic pattern has been applied to the surface of the workpiece 1, the workpiece 1 continues its advance, shown from left to
- 25
- 30

right in the figure, and reaches a conventional laser cutter 5. The laser cutter 5 cuts out items 6 of predefined shape from the workpiece 1. The laser cutter 5 is also digitally controlled, which makes it possible to easily modify the shapes of the cut-out items 6. Since the two-dimensional graphic design process is performed sequentially in one and the same line, the processing of the workpiece 1 can be managed by one and the same operator.

The workpiece 1 is made of corrugated board, which is a laminate material comprising two substantially parallel covering layers of paper material and a core of corrugated fibreboard placed between the covering layers, and at least one diffusion layer. Such a material is described, for example in patent application SE0200903-3. The material is suited to use as a construction material for fittings, furniture and other load-bearing constructions. It is furthermore a lightweight material, which facilitates any transporting of the items 6. The material is also recyclable in existing recycling systems, which meets the environmental requirements according to Agenda 21. The material has the advantage over other prefabricated component materials that it has a fire classification. This is of particular importance in the method according to the invention, since the laser cutting process carries a high combustion risk. It has now been shown that the corrugated board is not ignited by the laser cutting.

The two-dimensional graphic design items 6 can then be packed in packagings suited to this purpose. Since the items 6 are substantially flat, they are preferably packed one on top of another in order to make optimum use of the packing space. After packing, the items 6 are suitably transported to the location where the items 6 are to be assembled, for example to a shop.

Figs 2 to 8 show an example of an assembly of two-dimensional graphic design items 6 into a self-supporting and self-locking three-dimensional construction 7. In this example the construction 7 takes the form of a baker with a box which is intended to be filled with bread. Since no separate assembly elements, such as bolts and nuts, are needed,

assembly of the items 6 to form the construction 7 is a relatively quick operation. Moreover, since the construction 7 is self-locking no labour-intensive or time-consuming removal of the conventional assembly elements, such as bolts and nuts, from the construction 7 is required should the material be recycled.

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Fig. 9 shows how the graphics are incorporated into the construction 7 in the example above, in which the graphics may have advertising purposes. This obviates the need for separate advertising signs or advertising posters.

10 In one embodiment of the present invention any visible edges in the construction undergo conventional edge treatment before assembly, which may consist, for example, of thin strips of suitable material being adhesively bonded to the visible edge, possibly in combination with heat treatment.

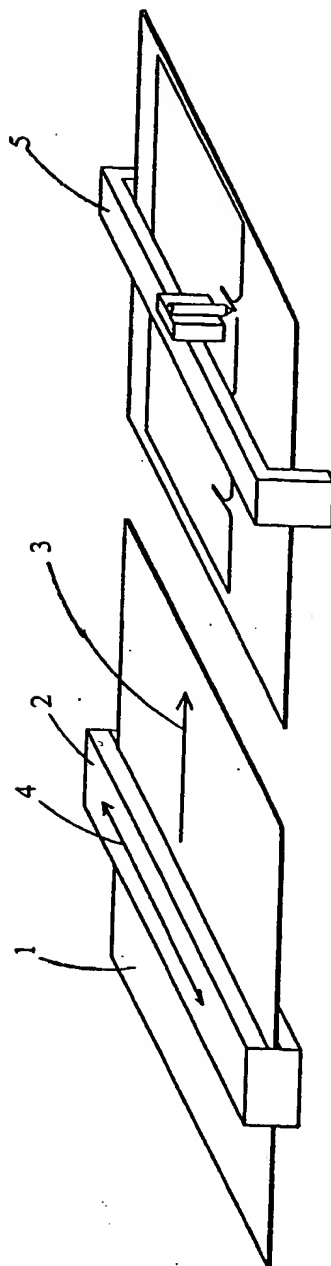
15 The aforementioned material can also undergo a conventional lamination process, which makes the construction 7 moisture-resistant. The workpiece 1 can undergo the lamination process either before the graphic pattern is applied and before the graphic design items 6 are cut out or after both these operations. An alternative to conventional lamination is for the workpiece 6, the graphic design items 6 or the construction 7 to be
20 coated with liquid lacquer or a moisture-resistant paint.

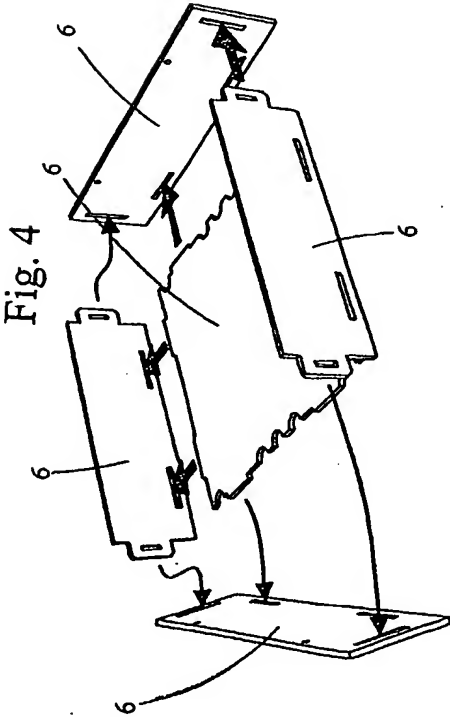
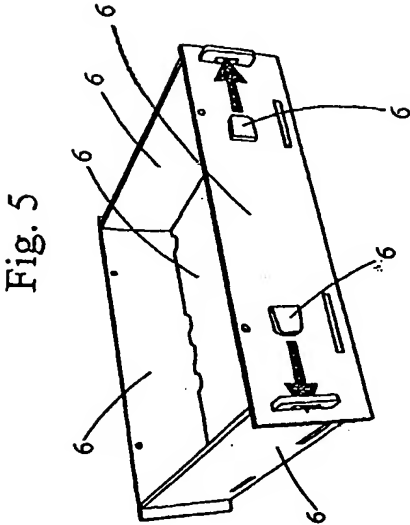
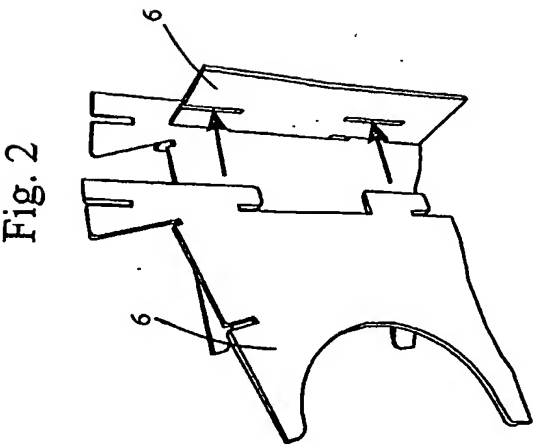
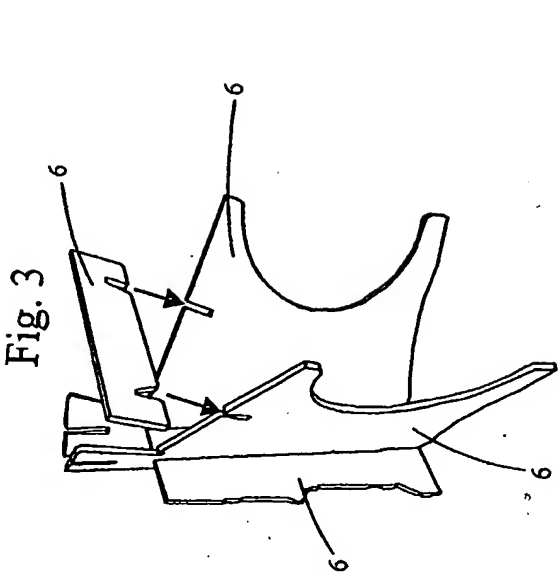
The assembly of two-dimensional graphic design items 6 into a construction 7 in the form of a baker with a box is described above. Since it is easy to modify the predefined two-dimensional graphic design process performed on the items 6 in the ink-jet printer 2
25 and the laser cutter 5, the method according to the present invention affords great scope for designing the items 6 to the client's special requirements. Thus it is possible to assemble most three-dimensional constructions without departing from the scope of the present invention. The graphic design, for example, need not have advertising purposes but may simply serve as decoration of furniture, for example, manufactured by the
30 method according to the present invention.

Claims

1. Method of producing through-cuts according to a predefined pattern in a substantially plane workpiece (1), which bears a pattern of predetermined graphic design, thereby creating two-dimensional graphic design items (6), **characterised in that** the chosen workpiece is corrugated board on which the following operations are performed sequentially in the following order.
- 5
- A the graphic design pattern is applied to the workpiece (1) by means of an ink-jet printer (2), and
- 10
- B the through-cuts are produced in the workpiece (1) bearing the graphic design by means of a laser cutter (5).
- 15
2. Method according to Claim 1, **characterised in that** the two-dimensional graphic design items (6) are assembled into a three-dimensional construction (7) according to a predefined three-dimensional pattern.
- 20
3. Method according to Claim 2, **characterised in that** the three-dimensional construction (7) is made self-locking.
4. Method according to any one of Claims 2-3, **characterised in that** an edge treatment is performed at least on visible edges of the three-dimensional construction (7).
- 25
5. Method according to any one of Claims 2 to 4, **characterised in that** the construction (7) is made water-repellent.

Fig. 1





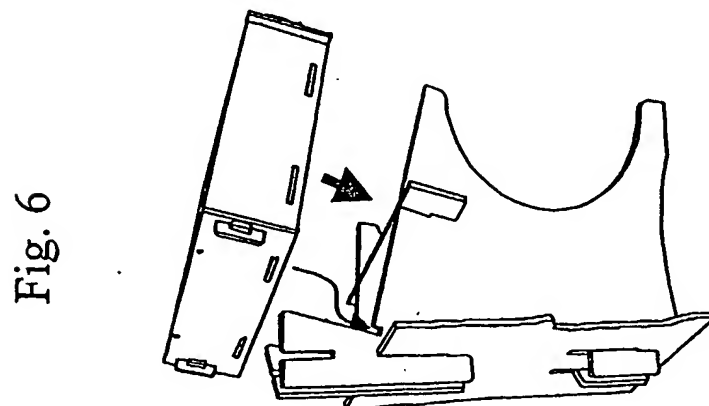
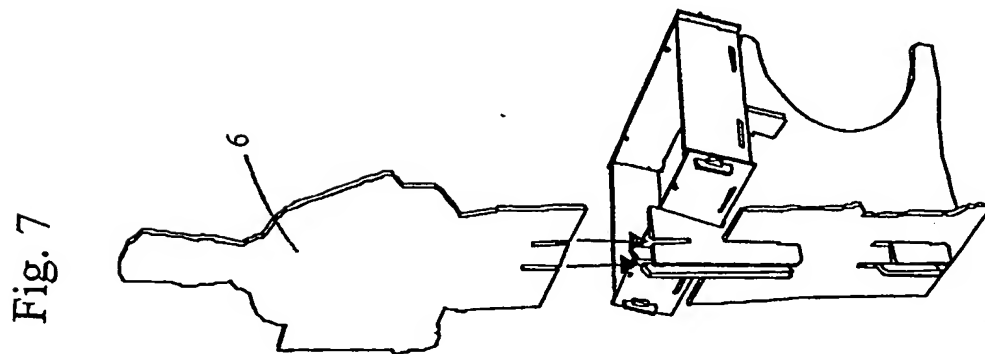
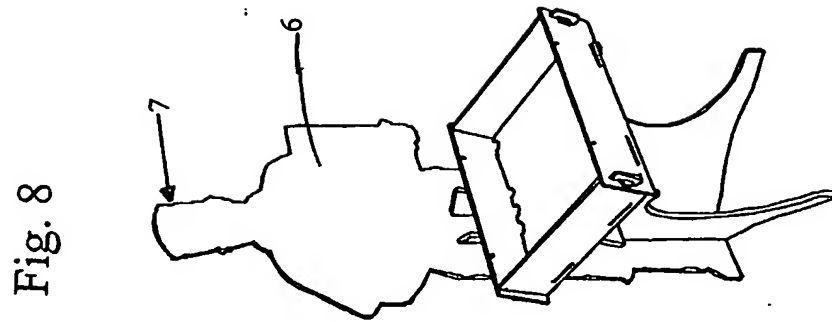
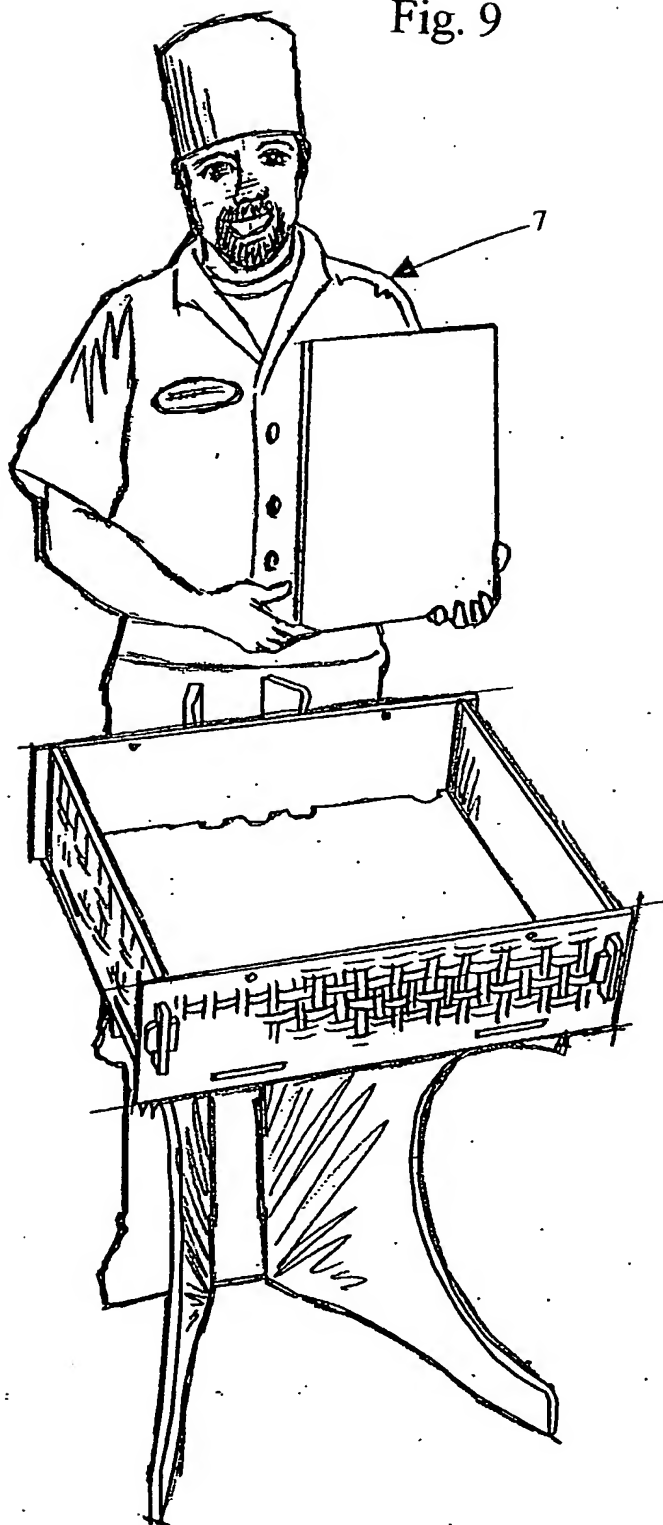


Fig. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 2003/001710

A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 0138097 A1 (ENCAD, INC.), 31 May 2001 (31.05.2001), page 8 - page 9, figures 1-5	1
Y	--	2-5
X	EP 0950752 A1 (GERBER TECHNOLOGY, INC.), 20 October 1999 (20.10.1999), column 1, line 46 - line 59; column 5, line 27 - line 32, figures 1-6	1
Y	--	2-5
Y	US 6109329 A (RUSSO), 29 August 2000 (29.08.2000), column 5, line 4 - line 61, figures 1-20	2-5
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0746140 A1 (MAX CO., LTD.), 4 December 1996 (04.12.1996), column 4, line 21 - column 5, line 11, figures 1-4 --	1-5
A	GB 153425 A (HORACE STANLEY CORDWELL), 11 November 1920 (11.11.1920), whole document --	1-6
A	FR 1350885 A (SOCIETE DE CARTONNAGES D'ECHANTILLONNAGE ET DE RELIURE D'AUBERVILLIERS (SCERA)), 23 December 1963 (23.12.1963), whole document --	1-6
A	EP 0357841 A1 (LEEWARDER PAPIERWARENFABRIEK B.V.), 14 March 1990 (14.03.1990), whole document -- -----	1-6

INTERNATIONAL SEARCH REPORT

Information on patent family members

24/12/2003

International application No.

PCT/SE 2003/001710

WO	0138097	A1	31/05/2001	AU	4304201 A	04/06/2001
				EP	1227936 A	07/08/2002
EP	0950752	A1	20/10/1999	DE	69901044 D,T	14/11/2002
				JP	3113243 B	27/11/2000
				JP	2000008216 A	11/01/2000
				US	6173211 B	09/01/2001
US	6109329	A	29/08/2000	US	6453973 B	24/09/2002
EP	0746140	A1	04/12/1996	JP	3039320 B	08/05/2000
				JP	8328779 A	13/12/1996
				KR	160393 B	01/05/1999
GB	153425	A	11/11/1920	NONE		
FR	1350885	A	23/12/1963	NONE		
EP	0357841	A1	14/03/1990	SE	0357841 T3	
				AT	102119 T	15/03/1994
				CA	1324420 A,C	16/11/1993
				DE	3888179 D,T	30/06/1994
				ES	2051829 T	01/07/1994
				JP	2107433 A	19/04/1990
				JP	2522553 B	07/08/1996
				US	5001325 A	19/03/1991